Reaching all Sectors of Society with RRI: Global Inclusive Innovation

ProGReSS Beijing meeting minutes

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Opening Speech

Dr YAO Zhizhong,
Deputy Director of IWEP, CASS

Mr Yao Zhizhong introduced the day with a welcome speech on behalf of the Chinese team and the Chinese Academy of Social Sciences (CASS). After warmly welcoming all attendants and participants, he outlined the relevance and interest of a project such as ProGReSS within the context of China's current challenges and priorities.

While CASS and IWEP have traditionally focussed on the world economy and its impact on China, recent developments have led to a shift in focus to China's economy and its impact in the world. IWEP has grown to be a leading research institute, collaborating with major research institutes and think tanks across the world.

How can innovation be encouraged to tackle new social objectives and challenges?

The ProGReSS project represents a welcome opportunity: a new collaboration in a very important research area. China's economy is transforming and will rely more and more on innovation. Along with this comes the necessity to address issues such as social conflict. The question is: How can innovation be encouraged to tackle new social objectives and challenges?

Members of the ProGReSS consortium

KEYNOTE LECTURES

Responsible Research and Innovation in China

By Dr. ZHAO Yandong (ZY), Senior Researcher, Chinese Academy of Science and Technology for Development, Ministry of Science and Technology

RRI is only a recent theme in Innovation, Science, and Technology studies, but hopefully one with a bright future. The fast paced development of science and technology in China has turned Chinese R&D investment into the third largest in the world. However, innovation in China is also facing more and more challenges, some of which are related to social and ethical issues.

Even if the term "RRI" does not appear as a term in the Chinese science and innovation policy, themes such as Responsible Research, Research Ethics, and Science and Technology Studies have been discussed for some time. The past science and innovation policy in China was driven by the following principles:

Globalisation in economic, social, political and scientific spheres strongly influences RRI in China.

- *Developmentalism*. Since the late 1970s promoting economic development was the priority of the government and the public, with a very limited formulation centred on GDP growth: '*Development is the absolute principle'* (Deng). Science and technology development was meant to serve the needs of economic development.

- *Scientism*. Science and technology were considered as the driving force of economic and social development by the government: '*Science and technology constitute the primary productive for*ce' (Deng), which turned into an innovation driven development strategy. Scientism can also be felt in the public's attitude towards innovation and it relates to a very positive discourse on the benefits of science and technology, (contribution to comfort, health, future prospects, etc.), along with a relatively high public trust in scientists.

- *Top-down decision-making mode*. Traditionally China is guided by a top-down government system, with a strong state, and a comparatively weak society, with limited scope for public participation.

Nowadays however, we witness major changes in the way China is looking at Science and Innovation policy. These changes are as follows:

- *The public*. China's fast-paced economic development leads to an increasing awareness of rights and risks. This also goes along with more interest from the public in social and ethical questions around innovation and technology. For example, the opposition to industrial projects (chemical) on grounds of safety, animal rights, etc.

(so-called NIMBY movements) is growing as well as challenges to the legitimacy of official academics with industrial ties (e.g. related to the tobacco industry). The change of the public's attitude towards the greater responsibility of scientists is also reflected in recent polls.

- *Government*. Realising the limits of developmentalism, there is a recent trend towards more inclusive development. The government is seeking to ensure a greater distribution of the benefits of science and innovation, in key areas such as population health, ecological environment and public security. The government also asks for more public participation in governance, **trying to involve more parties in 'social governance'**. The Ministry of Science and Technology has already started to promote public participation in the last round of forecasting and planning. New forms of participation are also taking place, e.g, a consensus conference on GM food organized by the Chinese Academy of Science (CAS) and local government in Beijing, 2008.

There is a recent trend towards more inclusive development...

- *Scientific Community*. The scientific community has been focussing on scientific morality and integrity for some time now, especially when faced with the development and the multiplication of problems, such as scientific misconduct. Major Chinese Science and Technology institutions (CAST, NSFC, CAS, and MOST[1]) have issued norms of scientific ethics, defining the principles, scope and tools to tackle common problems in research ethics. More recently, other societal and ethical issues have been more actively discussed by natural and social scientists.

- *Globalisation*. Globalisation in economic, social, political and scientific spheres strongly influences RRI in China. For instance, greater international publication rates go hand in hand with greater awareness and interest in ethical issues by individual researchers. The Global Ethics for Science and Technology (GEST project[2]), along with ProGReSS are leading initiatives in which the Chinese Academy of Science and Technology for Development (CASTED) and CASS involved and are in the direction of international cooperation, which is important in this field.

RRI is becoming an emerging trend in China. This trend will not only concern scientists (responsible research), but will extend to Innovation, hence involving industries, the public and the government. It is important that RRI is not only embedded in ideology, but also in institutions and practice.

[1] China Association for Science and Technology (CAST), National Science Foundation China (NSFC), Ministry of Science and Technology (MOST).
[2] www.uclan.ac.uk/gest

There are also many challenges ahead, some of which are outlined below:

- Striking a balance between being innovative and responsible - part of the debate is suggesting that the 'responsibility' limitation is too early a concern for China, which still needs to develop its innovation capacity.
- RRI will require reform of the Science and Technology governance system, economic system and social governance system.
- How to promote public participation in such a large and diverse country as China?

DISCUSSION

Philippe Goujon (PG) asked about the way forward with the 'implementation' challenge in the Chinese context, which seems to be still a highly hierarchical top-down structure. He also asked about education, and specifically how to avoid the risk of reducing Responsible Innovation to a tick-box approach, in terms of legal compliance, and how instead it would be possible to open up the mind of the actors involved.

Zhao Yandong answered that the first step is one of developing new ideas. China is witnessing interesting times of change as more and more pressure is building up from the public, which means that scientists are compelled to react.

Michael Davis (MD) suggested a point of clarification about a legal compliance vs. ethics approach to scientific integrity. The point of implementing ethics education programs is that they can provide internal reasons for ethical conduct beyond the external reasons the law provides..

Zhao Yandong responded that some measures are being developed with some technical universities setting up courses in Science and Technology ethics in natural science curricula, seeking to educate ahead of the beginning of new careers.

Doris Schroeder (DS) asked two clarificatory questions about the emphasis on more inclusive and more sustainable science and technology. What is meant by sustainable (is it economic or environmental sustainability)? And what is precisely meant by inclusive innovation?

The notion of 'inclusiveness' is a recent introduction in Chinese policymaking. The main change concerns the shift from serving mainly economic development and growth, to recognising the need to promote development that is society-oriented.

Zhao Yandong responded that the notion of 'inclusiveness' is a recent introduction in Chinese policymaking. The main change concerns the shift from serving mainly economic development and growth, to recognising the need to promote development that is society-oriented. Such development should improve people's living conditions and standards. How to make Science and Innovation more inclusive in China is the question. Issues such as poverty alleviation and more participation, amongst others, are the first priorities. Finally, when it comes to 'sustainability', both economic and environmental sustainability are considered.

Sachin Chaturvedi (SC) alluded to a common tension (or dualism) in the South between the 'urge to look right' (which he termed 'lip service' to address the foreign demand), while at

the same time making an effort to continue doing things as usual. In this context, SC asked how strong such a conflict of interests and intentions is within RRI in China today.

Zhao Yandong responded that such dualism still exists in the Chinese context, but also called to recognise that globalisation is leading to the interesting absorption of, for instance, Western ideas. Whether China likes it or not, the pressures are increasing, and the social change will have to be taken up and adapted to.

Michael Obach (MO) asked a practical question concerning the process of applying for national funding for science and innovation: are applicants required to fill ethical evaluation forms?

Zhao Yandong suggested that a later speaker (ZHENG Yonghe) will present related issues in full detail.

PG wished to underline that ethics is an important matter, and asked some clarification of China's shift of focus from an interest in Ethics of S&T to RRI.

Zhao Yandong clarified that the change was from a focus within the scientific community to extend beyond, talking more and more about conflicts between ethical norms in research and norms in society.

South-South Collaboration in Inclusive Innovation

Dr. Sachin Chaturvedi (**SC**), Director-General, RIS, India

SC thanked Doris for the opportunity to speak today.

The emergence of the South has provided opportunities for developmental linkages beyond trade and investments in the realm of Science, Technology and Innovation. In particular, change has been set in motion with the rapid growth in developing countries, particularly China, India and Brazil.

Developing countries accounted for nearly half of the world's gross domestic product (GDP) in 2012. South-South Collaboration (SSC) investment represents 33 per cent of global investment and accounts for more than half of total capital stock by 2030.

Approximately 56 per cent of exports from developing countries went to other developing countries in 2011. Even when China is excluded, South-South trade has been growing at an

average rate of 17.5 per cent per year over the past decade. Interlinkages and dependencies within the South are therefore growing rapidly.

The South-South oriented plans and development programs of the 1950s and 1960s are now coming to fruition: more money is flowing allowing development to happen regarding training and collaboration initiatives. This is important because there are many national complementarities within the South.

South-South Collaborations should aim at fostering these 'complementarities' in production, consumption, trade, investment and technology. Three fundamental principles are important: mutual respect, equality, and creating a win-win situation.

When it comes to Inclusive Innovation, three are the major A's of SSCs:

- Appropriateness
- Accessibility
- Adaptability

The three major A's of SSC and Inclusive Innovation are Appropriateness, Accessibility, and Adaptability.

Rationales for research collaborations are mainly:

- Common interests from shared concerns
- Complementary expertise
- Access to successful examples
- Capacity building

There are a number of rationales for entrepreneurial collaboration too:

- To address the needs of a common or similar population
- To minimize costs and risks
- To scale up capacity, as China, India and Brazil are coming to be seen as 'donors'
- Governmental push to extend influence through agenda-setting
- To access markets
- The role of expatriates

The North maintains an important role in facilitating South-South cooperation, and this can be seen in matters such as:

- Capacity building
- Foreign direct investment (FDI) in R&D and Joint R&D/R&D Centers in Developing Countries
- Collaborative R&D in emerging technologies such as nanotechnology, and biotechnology
- Reverse Brain-Drain and North-South Collaboration
- North benefits from Southern expertise and low cost of doing research
- South benefits from Northern countries' facilities, capabilities
- North-South-South Collaboration in Health Sector is a good example

However, SSCs are gaining in prominence, and in relevance. SSCs in the health sector, for example, provides a case in point, as it shows how it is possible to reach the bottom of the

pyramid[3] with inclusive innovation. Furthermore, focusing on inclusive innovation in SSC in the health sector can result in enhancing legitimacy of SSC, increasing its acceptability and demonstrating the rationale for SSC.

SSCs in the health sector occurs at 3 levels:

- ✓ Drug development
- ✓ Delivery mechanisms
- ✓ Governance

SSCs in health can take advantage of a number of complementarities:

- ✓ Similar genetic make-up across many populations of the South
- ✓ Developmental challenges
- ✓ Institutional limitations

Relevant impacts of such collaborations in terms of inclusive innovation include the motivation and change towards providing affordable drugs, with increased availability, enhanced accessibility, etc., but also increased capacity-building and self-reliance. This can be seen in cases such as:

- The IBSA[4] Dialogue Forum: HIV/AIDS of 2011 and Prevention and Control of Non-communicable diseases of 2011.
- The BRICS[5] Beijing Declaration: The emphasis on strengthening the South-South cooperation in health collaborations, thereby securing timely and affordable health products for improving global health.
- The South-South Initiative in Tropical Diseases (TDR): Working on diseases such as Malaria in Latin America, Africa and Asia.

In drug development, we see the multiplication of inter-institutional collaborations, and inter-firm collaborations, with many examples of both kinds. However, governance changes are still required, including changes in global institutions, as we have to face the fact that innovation is a majorly politicised process, with major trade barriers, institutional costs etc., getting in the way of significant positive developments, with Western overarching patent rules representing a main obstacle.

DISCUSSION

Philippe Goujon (PG): Performance clauses are being introduced as a requirement to foreign direct investment, with major issues such as tax evasion and environmental problems receiving growing attention.

Sachin Chaturvedi (SC) commented on the role of Global Production Networks (GPNs), emphasising that we have to understand that China's share of manufacturing is huge, its part of GPNs is not negligible, and in fact China has become the main global centre of it.

[3] In economics, the bottom of the pyramid is the largest, but poorest socio-economic group. In global terms, this is the 3 billion people who live on less than US$2.50 per day.

[4] The **IBSA Dialogue Forum** (India, Brazil, South Africa) is an international tripartite grouping for promoting international cooperation among these countries.

[5] Brazil, Russia, India, China, and South Africa.

Michael Davis (MS) Specific question on Cuba: We know about cooperation between Cuba and other countries, and clearly the USA not approving of it. How in practice did this collaboration in the area of health science and health care happen?

SC answered that Cuba's role in health development is enormous. However, several international programmes were simply dropped because Cuba was participating. On the other hand, Europe (e.g. Sweden) played an important role, providing expertise and training to Cubans. Since then, Cuba has set up very successful innovation programmes, for instance, in the areas of Insulin and Hepatitis B vaccines, with tremendous spill-over of the benefits for countries such as India, Brazil.

David Kaplan (DK): two questions regarding the large rise of multi-national corporations with R&D ventures in India and China. 1)What impact does this have on South-South cooperation? 2) What part of the research activities is being outsourced to China and India?

SC: 1) Some reinforcement. 2) It is not clear at all what will be the impact of research outsourcing regards to local benefit sharing, etc.

Enhancing inclusive innovation: Chinese equipment in Africa; a role for Government

David Kaplan (**DK**), Business Government Relations,
University of Cape Town, South Africa

Inclusive innovation and related issues are commonly referred to by different terms:

- Pro-poor innovation
- Inclusive innovation
- Frugal innovation.

While these terms bear some differences, they share a common denominator, as innovation that "serves extreme affordability users".

Such terms are currently in wide use across institutions such as academia, research organizations, business, donors, international financial institutions (IFIs). Why this sudden concern with inclusive innovation? These concerns can be traced back to E. F. Schumacher's *The Limits to Growth* (1972), but this message was limited to NGOs and specialised audiences. Since then, there have been two occurrences: 1) with global development concerns, the Millenium Development Goals have made explicit links between innovation and growth; 2) the growth of emerging markets with poor consumers, which are seen as very large and growing markets attracting the interest of new private investors, have extended the interest in inclusive innovation.

Growth in disposable income and rural urban migration are creating new large markets for dedicated consumer products. Product innovation and process innovation are emerging to

cater to these new markets. Process innovations are geared to the specific context in developing countries where labour is cheap and capital costs are high. Thus these innovations tend to be far more labour absorbing and capital saving. The gains for the producer are: more employment intensive processes; new firm entry; more dynamic firms in the South. The gains for the consumer are: more appropriate products; better functioning products, attuned to the environment.

The global spread of Inclusive Innovation: Chinese machinery in Africa

Chinese models are entering markets (sewing machines, knitting machines, lathes, tillers, etc.) at a fraction of the cost, and more appropriate to the needs of consumers (both workers and small scale users and enterprises) in developing countries, i.e. they are both much cheaper and more labour intensive.

Some advantages of Chinese equipment:

Chinese equipment in Africa is allowing new African producers to enter markets with fewer barriers as they face lower acquisition costs for equipment (allows for new small scale and less capitalised new entrants). Chinese equipment is also smaller scale and adapted to more labour intensive production, and hence generates further employment opportunities.

Some disadvantages of Chinese equipment:

It tends to be less robust (requires more careful usage),
It requires more maintenance and servicing.

Process innovation in Inclusive Innovation leads to an increased labour intensity creating more employment opportunities for poor people.

Local adaptations are another interesting phenomenon, for example, parts of Chinese machinery that are less robust or effective are often replaced with second hand Western parts to extend their life in an African context. These are market driven processes that are faciliated by the inflow of small scale, more affordable machinery – a source of profit for their manufacturers.

But not all inclusive innovation can come from the market. There are indeed numerous sources of market failure for inclusive innovation, such as:

- very poor and very marginalised individuals without significant disposable income (e.g. subsistence farmers), who fail to generate effective demand;
- products that require a long gestation period and/or are characterised by considerable uncertainty and thus require considerable support.

An example – low cost housing

South Africa has a huge need for low cost urban housing. Instead of isolated efforts, we need to develop the specifications for what low cost housing could look like – something that only a government can initiate. A mission-oriented (e.g. housing) inclusive innovation should:

- identify the needs of the poor;
- set aside ring-fenced funding;
- define the “mission” precisely;

- set key performance indicators (KPIs)
- establish responsible relatively autonomous agencies with funding and convening power;
- enable a coherent governance for innovation (government departments working together).

To conclude, there are no clear measures of "social" or pro-poor innovation. However, inclusive innovation directed to the poor should not be seen as not pro-business. Innovation for competitiveness, finally, should not be seen as pro-business and not pro-poor. There is, in fact, the need for complementarity: for growth to be sustainable it should be inclusive.

> *Inclusive Innovation is sustainable and competitive innovation, and must be considered as both pro-poor and pro-business.*

DISCUSSION
was taken together for three speakers, see below.

National Natural Science Foundation of China: An Overview and its Responsible Conduct of Research

Yonghe Zheng, Deputy Director General, Bureau of Science Policy, National Science Foundation of China

After presenting the overall structure of Science and Technology policy-making in China, Yonghe Zheng presented some figures documenting R&D funding in China over the last twenty years, which have followed exponential growth of annual R&D expenditure in China, but with basic research only representing a small part of it (around 5%).

The National Science Foundation of China (NSFC), established in 1986, is a major funding agency for basic research in China, supporting creative research and talent training in broad areas (maths, chemistry, physics, life sciences, earth sciences, engineering, information sciences, management science, and health sciences). Its mission is to support basic research, foster talented researchers, strengthen international cooperation, and promote socioeconomic development.

The current chairman [Wei Yang] has issued a new vision for the NSFC: FRIEND of scientists, which is a science system that is Fair, Rewarding, International, Efficient, based on Numerous resources, and a mobilising Diversified tool. The NSFC budget has been increased

exponentially, reaching RMB 19 billion in 2014. The increase in the number of proposals has led to the set-up of an elaborated evaluation process.

Funding structure

Funding opportunities are offered for research programmes, individual and group talent, and the broader research environment. Yonghe Zheng provided an in-depth description of the research programs, of which a summary of contents is provided below.

Different research programs for different purposes:

- General program (individual curiosity-driven research)
- Key program (researchers dealing with the exploration of key scientific issues with a given research goal and scale)
- Major program (multidisciplinary and comprehensive research on strategic key scientific issues)
- Major research plan (an integrated cluster of projects with unified objectives or orientations to be carried out concertedly by excellent research teams)
- International (regional) joint research program (joint academic activities between mainland Chinese scientists with researchers from other countries and regions).

Responsible conduct of research

The NSFC has two main governance approaches to ensure research integrity:

1. The promotion of responsible conduct of research
    a. Establishing guidelines and regulations
    b. Disseminating cases ('best practice') on research integrity
2. Policies for handling misconduct
    a. Misconduct and its penalty categories: fabrication, falsification, plagiarism, and other
    b. Procedures for handling research misconduct (penalty measures): warning, retraction, and disqualification.

Over the past decade, the NSFC has seen a diminishing number of penalties (*a decline of 70% in the fraction of alleged application misconduct over the past 14 years*), which is an encouraging result of the strengthening of procedures and more active attitudes towards handling misconduct.

DISCUSSION

was taken together for three speakers, see below.

RRI in a Global Economy – A European perspective

Philippe Goujon (PG), University of Namur, Belgium,
Co-ordinator GREAT Project

Philippe Goujon (PG) warned, especially the non-European audience, that the views he was about to present were his own, and not the equivalent of a homogeneous European view. It is indeed very difficult to present a European perspective on RRI, as it would presume prior definition and agreement. PG insisted on the fact that he wouldn't know what RRI is exactly, as RRI should not be taken as a definite answer, but rather as opening up a whole set of questions.

Outlining the European context, PG suggested that the need to conduct research and innovation more responsibly emerged from particular pressing societal tensions, such as opposition to GMOs, nanotech, fracking[6], and the need to refer to ethics in order to address such problems and related issues. Why this move from the ethics of science and innovation to RRI then?

PG suggested that the recent attention on RRI could be seen as an opportunity to define something new, rather than just pouring old wine into new bottles. This opportunity must be considered in the wider context of 1) globalisation (competition, need for flexibility, need to justify increased investment in Research and Innovation); 2) pressing grand challenges, and 3) the rise of ethical concerns from the public.
RRI is based on a number of key elements:

- ✓ Responsibility
- ✓ Transparency
- ✓ Interactivity
- ✓ Ethical Acceptability
- ✓ Sustainability
- ✓ Social Desirability
- ✓ Embedding of Scientific and Technological Advances in Society

However, the link between them, and what makes them coherent, is *reflexivity*: How can these notions (accountability, responsiveness, etc.) be embedded in a governance framework? To answer this question, it might be useful to focus on examples of **irresponsible** innovation. This should help to understand what RRI is.

It is evident from popular examples that irresponsible innovation involves:

- neglecting of ethical principles
- technology push
- policy push

[6] Hydraulic fracturing, or "fracking", is the process of drilling and injecting fluid into the ground at a high pressure in order to fracture shale rocks to release natural

- lack of foresight/precaution

GMO in Europe is a case in point where the framing of the context for participation is determinant: a promising new technology with alleged potential to address different social problems has been generally rejected and subject to public hostility in EU, leading GMO research to a deadlock. However, the European Commission framed the GMO problem from the beginning as a knowledge problem, while it was in fact a question of representation of the technology.

How should RRI be applied?

RRI is not a solution ready to use in pressing ethical issues in science and technology. We need to consider the normative horizon. Applying an RRI framework to specific science and technology issues might be not the best solution. RRI should instead operate on a broader level such as 1) describe systemic unfairness in innovation structures, 2) acknowledge the grand social challenges agenda, and 3) illuminate changes in innovation context. This implementation of the RRI principles will develop on two intersecting dimensions of the innovation process:

- the product dimension
- the process dimension
- (and perhaps a third should be added: the normative dimension)

Finally, we should not forget that the existence of multiple definitions of RRI is an indication of RRI still being undefined and having an open meaning. Much interesting work needs to be done still in defining RRI, its framework and its implementation criteria. As a conclusion we can say that RRI is an overarching framework that integrates and adds to existing tools in order to create a more thorough and flexible approach to governance.

DISCUSSION (FOR THE 3 PRECEDING PRESENTATIONS TOGETHER)

Michael Davis for David Kaplan: Conflict between David's view of RRI, a globalised form, and the European perspective. Europe and the USA have lost their ability to make cheap products for the bottom of the pyramid. Are these failed opportunities?

DK: Essentially what is happening is that such innovation in the West is primarily directed at the middle classes, and has been for a long time now. The difference with developing countries is that increasingly poor consumers are entering into markets, but America and Europe are failing to get involved because of distance and even more because they are remote from these consumers - from appreciating their needs.

Stephan Lingner to David Kaplan: Would the protection of local markets regarding employment of the poor be a prerequisite for such a model?

DK: I think protection is not an answer. Protection often means higher prices and that is not good for the poor. I would favour government programs that are specifically geared at meeting the needs of the poor where there is a large and continuing local demand - such as low cost housing in South Africa.

Doris for Zheng Yonghe: You have given examples of research misconduct, such as plagiarism, and the efforts of your organisation against such. What about the misuse of research participants?

ZY: That is, of course, also extremely important and the NSFC requires full adherence to ethics guidelines when involving human participants.

China's blueprint for scientific and technological innovation

SUN Ping, Institute of Scientific and Technical Information of China (ISTIC)

SUN Ping provided an overview of the challenges related to research and innovation in China, and suggested that some important policy documents have drawn a blueprint for innovation.[7] He first highlighted that innovation is a complex process, with many definitions, before providing a structured narrative to illustrate the Chinese case as follows:

1. Where are the technologies?

While R&D investment has been and still is very important in China, it appears that the outcomes of such investment are not yet satisfactory. Hence there is much room for improvement.

2. Obstacles to RRI in China

The research management and administration is bureaucratic in nature. The research administration needs to be improved, e.g. some resources were wasted on repetitive research and unnecessary equipment, misuse for personal gains, or even embezzlement (the occurrence of research misconduct). The orientation of research is focused on publishing. Many institutions seek publishing more scientific papers and higher ranking of the institution. Publishing more papers is also a major incentive for researchers to get promotion, awards, better benefits and more research resources.

[7] A series of important documents to be considered in order to understand the Chinese context include:

- The Report to the 18th CPC National Congress, by Hu, Jintao (November 8, 2012) http://www.china.org.cn/chinese/18da/2012-11/19/content_27152706.htm.
- Opinions on Deepening the Reform of the Scientific and Technological System and Speeding up the Building of a National Innovation System, issued by the CPC Central Committee and the State Council (September, 2012) http://www.most.gov.cn/eng/pressroom/201211/t20121119_98014.htm.
- Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform, issued by CPC Central Committee (November, 2013) http://www.china.org.cn/chinese/2014-01/17/content_31226494.htm.
- Opinions on strengthening and Improving the management of research projects and fund supported by the central government's financial capital, issued by the State Council (March, 2014).

Science and Technology system reform needs to be strengthened. Some substantial measures should be taken to improve the distribution of research resources, the assessment of research outcomes, and the evaluation of talented researchers and developers.

The communication between researchers who study policy issues and policy makers could be improved as many research findings are not delivered to, or used by policy makers.

Except for bioethics, research ethics in physical and social sciences is not sufficiently emphasized and taught.

Finally, the communication between researchers and the public is problematic, e.g. in GMO debate.

3. Some innovation-related problems

SUN Ping summarized the main problems identified in *Opinions on Deepening the Reform of the Scientific and Technological System and Speeding up the Building of a National Innovation System*, issued jointly by the Communist Party of China (CPC) Central Committee and the State Council. The problems are:

- the status of enterprises as the major driving force of technological innovation has not been truly established;
- collaboration among enterprises, universities, and research institutes remains weak;
- technology and the economy are yet to be truly integrated;
- the number of domestically-generated advances in science and technology is too low;
- the lack of self-sufficiency in regard to key technologies is problematic;
- the allocation of scientific and technological resources is dominated by administrative considerations, with limited and inefficiently employed resources often spread across repetitive and unrelated projects and utilized inefficiently;
- scientific and technological projects and their funds are managed inefficiently, leading to low rates in the commercialization of research results;
- evaluation systems for advances in science and technology are as yet unable to effectively channel research efforts into areas where they are most needed;
- efforts to establish a research culture that values integrity and innovation need to be improved.
- researchers are not fully motivated to bring their initiative and creativity into full play.

Recent efforts by some key players include:

- To develop top-level design and relevant regulations
- To intensify research and innovation targeting critical scientific and social problems
- To raise the awareness of RCR related issues

Some observations

Innovation should be undertaken responsibly. Given the situation of S & T development in China, it seems that promoting innovation is the focus of major policy documents, and the structure for promoting RRI has been formed.

Policy makers and scientific staff have reached a broad consensus over major policies and practical measures, including guiding principles. It is important to develop governance capacity of policy makers, as the implementation of policies and plans is much more difficult than drafting documents, developing a framework, or drawing a blueprint. To do so, it is necessary to strengthen the communication between policy makers in different countries. Many innovation-related policy documents and research findings developed in the EU etc. are available and accessible: developing countries can learn from these experiences.

Researchers in the RRI field should work together, to develop a globally accepted code of conduct and strategies for promoting RRI and the efficiency and effectiveness of innovation, such as saving the soaring journal publication fee and subscription costs.

Researchers in the RRI field should work together, to develop a globally accepted code of conduct and strategies for promoting RRI and the efficiency and effectiveness of innovation.

Addressing Societally Desirable Goals through Research and Innovation

Doris Schroeder, Coordinator of the ProGReSS Project, and Han Bing, research fellow at IWEP

Doris presented the overview on behalf of both. She started with a quote from Jack Stilgoe: “There are reasons why the world’s combined innovative capacity has spewed forth iPhones and space shuttles but not yet managed to produce clean energy or universal access to clean water.” And continued to show the geographic reach of the partners in ProGReSS and to introduce Rene von Schomberg's RRI definition.

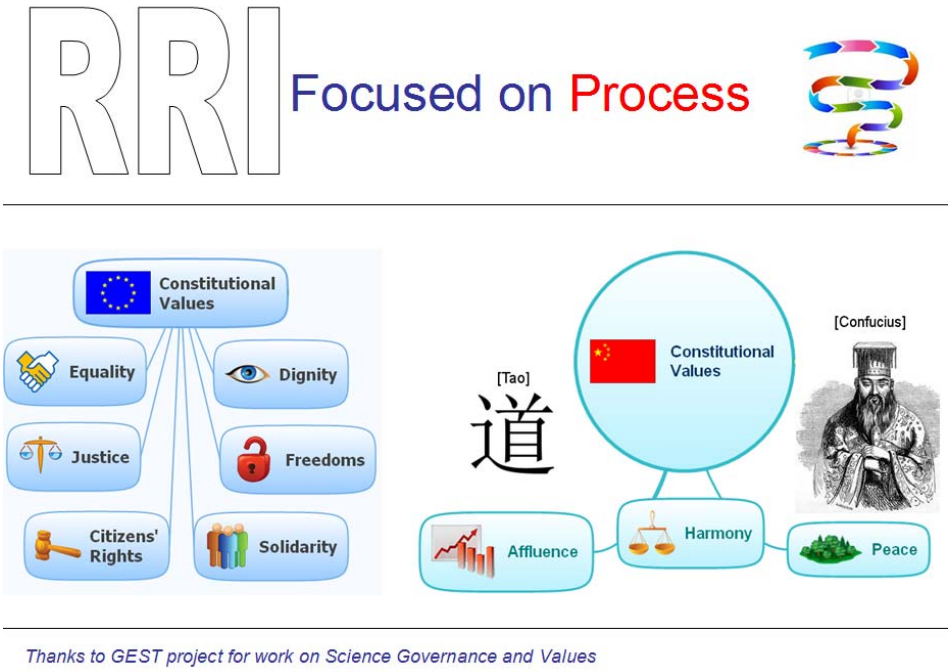
Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and ***societal desirability*** *of the innovation process.*

ProGReSS is focusing most efforts on societal desirability of research and innovation and Doris emphasized that there are outcome and process elements to the concept. In terms of outcomes, the question remains who decides what societally desirable outcomes are. ProGReSS has looked towards humanities' grand challenges as a guiding light for societal

desirability. At the same time, constitutional values and principles could be used to guide the processes to determine what is societally desirable.

The following draft conclusions were drawn from ongoing work:

1. Government has to play an important role in guiding research and innovation to reach those without significant disposable income.
2. Grand Challenges could drive the outcome side of publicly funded research and innovation.
3. Fundamental Values could drive the process side of publicly funding research and innovation.
4. Main challenge – blue sky research and the freedom of academia.



Thanks to GEST project for work on Science Governance and Values

What is important for the San when engaging with industry

Leana Snyders and Andries Steenkamp, the South African San Institute (SASI)

Speech added in full.

The San Community represent the oldest most marginalized inhabitants in Africa. We are hunter gathers that currently live in Southern Africa, mainly in Botswana, Namibia and South Africa, with scatterings of populations in Angola, Zimbabwe and Zambia. We still live

by our cultural practices and the traditional values of our ancestors. We believe in the conservation and sustainable use of our biological resources.

In 2001 the San realized how valuable their Traditional Knowledge (TK) is an ever since we are participating and collaborating with research institution and industry. We can rely on 13 years of lessons learned, good and bad. Therefore we came to the following conclusions.

What do we expect from Research institutions or Pharmaceutical or Nutraceutical companies? We expect them

1. Acknowledge the San as Traditional Knowledge holders.
2. How about 'This may take a variety of forms, from formal acknowledgement of the San traditional knowledge, to the awarding of contractual rights to patents and other products.'
3. Respect San community structures and protocols. In practice this means, filling in the WIMSA Media and Research Contract prior to engaging with the community (for instance, through interviews).
4. Form a longer term partnership with the community and negotiate a benefit sharing agreement to reflect all components of the partnership.
5. Ensure that San representatives are part of the entire research and innovation process.
6. Provide annual progress reports on existing collaborations.
7. When commercial benefits are derived from the commercial collaboration, the benefit sharing agreement must be followed in all respects.
8. There should be transfer of technology and skills development in communities and these benefits must be anticipated in funding proposals. This could include higher education, including at PhD level for community members.
9. Provide any output (e.g. publication) on completion of the research to the community. If a community and/or an individual assisted with the research, they must be acknowledged, including as co-authors.
10. In addition to the commercial benefits flowing from the collaboration, further non-monetary benefits such as education, training, livelihood and job creation, community health and other such projects should be shared, where appropriate.

Form a longer term partnership with the community and negotiate a benefit sharing agreement.

Seeking for Even Distribution of Benefits from Technological Innovation and Economic Development

Dr. REN LinProf. Yao ZhizhongIWEP, CASS

Technological innovation has increasingly become a source of economic growth, economic development, and social wealth. However, many countries have no sufficiently advanced institutional arrangement to balance the conflict between the role of technological innovation and the overall welfare of whole societies. The tension between the two surges, since technological innovation is advancing rapidly, while the poverty gap is growing.

China has put more and more emphasis on the necessity of "Socioeconomic Development Oriented Responsible Research and Innovation" in recent years. The report of the 15th sustainable development strategy has indicated that sustainable development policies are demanded to target a long-term economic development strategy.

In China, the fiscal policy serves as a pillar of state governance, which has also been emphasized in the Third Plenary Session of the Eighteenth Central Committee of the Communist Party of China (CPC). This conference has highlighted that the purpose of reform is to allow more benefits coming from development to be equally shared among all people.

At present the new government continues to implement a proactive fiscal policy, which has a focus on the aspect of building independent innovation capacity and new strategic industry sectors. The funding priority was given to scientific and technological innovation.

The agencies involved in scientific and technological innovation are the State Department of Science and Technology, the National Development and Reform Commission, the Ministry of Finance, the Ministry of Construction, and the Ministry of Education. The strategy pursued so far has been based on:

- Adjusting the role of the market: Perfecting the market-oriented technical innovation mechanism is necessary. The market should play a guiding role in technology research and development direction, but cannot entirely dominate the route selection of innovation, since social justice should be included too.
- Adjusting the role of government: Government has increased financial support for innovation to establish a diversified investment mode. The government proposes appropriate support policies to improve the relevant information platform and education, which makes the innovation activity more transparent and beneficial to the people.

- Adjusting the role of research and education: Set up a collaborative innovation mechanism on studying, researching and producing. Promote the role of responsible researchers and research institutes.

Grand challenges

There are three major challenges that many countries are faced with, which China could learn from when it comes to policy making:

- **Uneven Income:** For example, the uneven distribution of educational resources affects the quality of labour resources in certain areas, which means that it could lead to an unevenness to obtain employment or a better career.
- **Uneven Capability:** The uneven distribution of educational chances could also lead to fewer chances to use the result of technological innovation, for instance, a reduced capability to obtain access to internet resources. Even if the first level problem, namely material shortage problem, is settled, the second one could remain.
- **Uneven Institutional Supported Rights:** If the institutional design does not guarantee fairness, in order to a fair competition environment within the market, people might receive an uneven distributed right to enjoy the results of technological innovation and economic growth. Moreover, if the institutional design cannot establish a fair social security system, it is also hard to enable people to obtain social fairness. Last but not the least, education plays a great role in spreading the result of technological innovation and economic development. Therefore, institutional design brings together market and non-market forces to ensure an even distribution of rights for people to enjoy equally the result of technological innovation and economic growth.

The strategies that can be used to face those grand challenges range from Inclusive Growth, to Inclusive Development and Inclusive Innovation. Some of the initial steps to take in order to implement an inclusive approach to growth and development could be:

- to establish a fair social insurance system that would ensure an even distribution of wealth.
- to enhance the quality of human capital through better education.
- to guarantee the fairness of the institutional design and policy making.

PANEL DISCUSSION – INNOVATION FOR AGEING SOCIETIES

Ageing and birth sex ration: facing challenges in future China

Zhang Yi (ZY), Institute of Sociology, Chinese Academy of Social Sciences

Zhang Yi presented the Chinese perspective on ageing by focusing on 1) population transition, 2) ageing and the empty nest family, and 3) birth sex rates and science support.

1) The Chinese family planning policy (one child policy) has led to the drastic shrinking of the percentage of the younger population. A strong increase in life expectancy is also expected to continue, further exacerbating the problem of ageing societies.

2) Family support is weakening, mostly for two reasons:

- because of migration within the country, leading to isolation of individual family members;
- because an increasing number of single households or couples are now living without children and therefore later without support.

3) The birth sex ratio is terribly imbalanced in favour of males. The shortage of women is creating a huge societal issue. This imbalance is in great part related to ultrasound technology that leads to greater abortion rates for pregnancies with female babies.

Life expectancy in China

According to the Census of 2000, male life expectancy was 69.63, while female's was 73.33. According to the Census of 2010, male's life expectancy was 73.21, whilst female's was 76.52 and it is estimated to become 80 years for males, and 85 years for females in the year 2050. This situation represents "the largest, the highest, and the longest" gender imbalance in the world. Chinese young cohorts will soon face a Grand Challenge.

Innovation in an Aging Society

Michael Davis (MD) and Kelly Laas,
Center for the Study of Ethics in the Professions
Illinois Institute of Technology

MD presented an overview of the population trends in America based on data and figures from the 2010 Census:

- under age 18: 74.2 million (24.0 % of the total population)
- ages 18 to 44: 112.8 million persons (36.5 %)
- ages 45 to 64: 81.5 million persons (26.4 %)
- over 64: 40.3million persons (13.0 %)

By 2050, the over 64 will be 88.5 million persons (20.2%).

- The phenomenon these data referred to is also called "the Graying of America" and illustrates some characteristics of the ageing trend of the American context. These characteristics are:

- the absence of forced retirement, meaning that many elderly will continue to be active members of the economic society;
- the laws protecting against age discrimination in employment;
- the option to receive a full pension after turning 70 and still being allowed to continue working.

Thanks to these peculiarities of the US system, many of the typical problems or fears (of economic burden) associated with the ageing phenomenon in other economically developed countries do not seem as serious in the American context. Furthermore, the ageing population in America is fostering the technology and innovation process of the country by being at the core of the Innovation for Ageing, and by turning into a population where aged individuals can be innovators themselves, defying common beliefs that older individuals are only on the receiving end of the innovation process.

The ageing population in America is fostering the technology and innovation process of the country.

The Kindle and the growing requests for eBooks are a clear example of Innovation for Ageing.

As examples of "aged as innovator" MD presented a few cases:

- George Weiss, 84, invented app, Dabble: The Fast Thinking Word Game.
- Barbara Liskov, 79, Leads MIT's Programming Methodology Group which is exploring how to build distributed and fault-tolerant systems that continue to work even when some components fail.
- Mildred Dresselhaus, 82, first scientist to exploit the thermoelectric effect at the nanoscale that could allow devices to harvest energy from temperature differences in materials that conduct electricity.

The German Context of Innovation for Ageing Societies

Stephan Lingner (SL), deputy director of the Europäische Akademie zur Erforschung von Folgen wissenschaftlich-technischer Entwicklungen Bad Neuenahr-Ahrweiler GmbH

While presenting data about the ageing demographic trend in Germany, SL highlighted important features that distinguish the German scenario from the US and Chinese ones.

In Germany, the number of people over 64 years represents 21% of the entire population, much more than the corresponding shares in the US (13%) or in the whole European Union (17%), while the young generation (below 19 years), is currently 12% of the

Unlike the US, Germany will also undergo a significant population loss within the next decades.

German population, in the US this group is twice as high. This means that the current proportion of elderly in Germany is already as high as the projected proportions in the US for the year 2050, and Germany is now facing a demographical problem that the US will face in the future.
The ageing trend will continue in Germany on relatively high levels. Unlike the US, Germany will also undergo a significant population loss within the next decades. Therefore, the demographic change in Germany seems to be fairly critical, raising a number of challenges that need to be addressed. These are:

- the health and social care system, as well as the national retirement system, where the accelerated ageing trend might lead to the rationing of social services;
- younger citizens, which will be confronted with growing transfer payments for the elderly and
- the economy at large might shrink.

The National German policy (Demographiestrategie) is tackling those challenges by focusing on the following action points:

A. Securing the autonomy and life-quality of the elderly;
B. Compensation of ageing impacts on the economy through:
   - open immigration policies,
   - growth and employment programmes for better education, research and development,
   - family and career programmes for better access to kindergartens and after-school centres to increase domestic birth rates and to raise gross national economic and social benefits by enabling both parents to enter the workforce,
   - balanced budget measures for the consolidation of national debt and debt services.

The re-adjustment of the legally-fixed retirement age from 65 to 67 years has been recently debated and partially adopted.

Specific options for innovation are given by:
a) the development of technical support systems for the autonomy of the elderly (mainly from ambient assisted living concepts):

- tele-care/tele-health systems,
- smart homes,
- taylored ICT and mobility solutions.

b) Non-technical options for the societal inclusion of the elderly:

- life-long learning concepts,
- elderly competence networks,
- multi-generational homes,
- tailored travel offerings for elderly with more leisure time.

The Australian situation

John Weckert (JW), Professorial Fellow at the Centre for Applied Philosophy and Public Ethics and Professor of Computer Ethics at Charles Sturt University

John Weckert presented the Australian situation that happens to be very similar to the US situation characterized by rising life expectancy, the absence of a compulsory retirement age, and 65 being the minimum age limit for accessing to the old age pension.

Highlighting that this is most likely to change due to upcoming elections, JW described the current concerns of the Australian government:

- increase retirement age
- tighter restriction on access to pensions
- encouraging people to keep working longer.

Rising life expectancy, absence of a compulsory retirement age, and 65 as the minimum age limit for retirement: Australia's situation is very similar to the US'.

In terms of innovation, JW suggested that the main focus would be what has been labelled 'gerontechnology': technologies dedicated to particular needs of the elderly, such as 'carebots'.

DISCUSSION (FOR THE PANEL)

David Kaplan: Aged individuals may be less productive. No one wants to be a care worker anymore: is this role filled by immigrants now?

Michael Obach: We need to understand better the relationship of the ageing individual with care technology. We possibly need to put more human beings in between.

Stephan Lingner: In Germany, at the moment, an inherent scepticism about robot care does exist.

Philippe Goujon expressed his disagreement with the suggestion that elderly individuals are less productive individuals, as productivity might depend on a specific social context.
What would it be, the political measure to adopt addressing the ageing issue: social innovation, political innovation?

Gender-savvy writing for publication

Fatima Alvarez Castillo, Professor of Social Sciences,
University of the Philippines, Manila, the Philippines.

When writing for publication, there are a few things that can be wrong from a gender equality point of view, and there are no clear guidelines on how to solve them. For example,

- *pronouns*: the masculine pronoun is the default pronoun
- *nouns*: stereotyped roles carried over into writing (i.e. chairman).

Some strategies can be implemented though:

- change your noun: - ex: chairman can be chairperson; "*all men are created equal*" to "*all people are created equal*".
- change your noun to plural - ex: "*A student's beliefs about feminism may be based on what he has heard in the popular media*", can become "*Students' beliefs about feminism may be based on what they have heard in the popular media"*.
- write out both pronoun options as "she or he" or "she/he." – ex: "*Each student who majors in Women's Studies major must take a course in Feminist Theory. She or he may also get course credit for completing an internship at a local organization that benefits women*".

Sex or gender

A common error in survey forms occurs when gender is used for sex. Example: using the term "gender" when talking about Male or Female.

As you are writing, ask yourself whether what you are talking about is someone's biological makeup or something about the person's social being. For example, "*To be male,*" is an expression of biological sex. "*To be a man*," however, expresses the socially constructed aspects of masculinity. If you're referring to biology, use "male" or "female," and if what you're talking about has to do with a behaviour or social role because of her/his biology, use "woman" or "man."

What does it mean to be male? What does it mean to be a man?

Some tips toward gender-savvy writing

Be alert to the gendered pattern of our writing (which reflects our thinking), and if possible get a gender-savvy copy editor.

Ask yourself the following questions:

- ✓ Have you used “man” or “men” or words containing one of them, to refer to people who may be female? If so, consider replacing them with another word. For example, instead of “fireman,” try “fire-fighter.”
- ✓ Do you use occupational stereotypes? For example, female pronouns for elementary school teachers and male ones for scientists?
- ✓ If you have mentioned someone’s gender, was it necessary to do so? If you identify someone as a female architect, for example, do you (or would you) refer to someone else as a “male architect”? And if you do then note that the woman is an attractive blonde mother of two, do you mention that the man is a muscular, dark-haired father of three? Unless gender and related matters -looks, clothes, parenthood- are relevant to your point, leave them unmentioned.
- ✓ Have you used “he,” “him,” “his,” or “himself” to refer to people who may be female?

Gender imbalances in research-based publications: the ‘productivity puzzle’.
One of the gender imbalances in research-based publications is known as the 'productivity puzzle'.

Men publish more papers, on average, than women, although the gap differs between fields and subfields. Women publish significantly fewer papers in areas in which research is expensive, such as high-energy physics, possibly as a result of policies and procedures relating to funding allocations[8].

Women are less likely to participate in collaborations that lead to publications, and they are much less likely to be listed as either first or last author on a paper. All articles with women in dominant author positions receive fewer citations than those with men in the same positions. Women's publication portfolios are more domestic than their male colleagues suggesting that they profit less from the extra citations that international collaborations can produce. The productivity puzzle can impact promotions, tenureship, grantsmanship – and can worsen gender disparities already seen in fewer female full professors than males ones.

Biases are also embedded in citation counting, and it is a fact that men dominate scientific production in nearly every country. Globally, women constitute on average only 29% of all researchers, and they account for fewer than 30% of fractionalized authorships, whereas men represent slightly more than 70%.

For every article with a female first author, there are nearly two (1.93) articles first-authored by men. However, South American and Eastern European countries demonstrate greater gender parity. Only nine countries had female dominance in terms of proportion of authorships, and five of these (Macedonia, Sri Lanka, Latvia, Ukraine, and Bosnia and Herzegovina) are countries with lower scientific output. For the 50 most productive countries (accounting for 97% of the total publications), female collaborations are more domestically oriented than the collaborations of males from the same country.

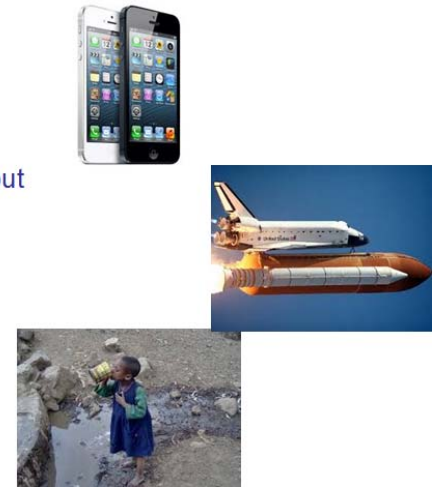
[8] http://www.nature.com/news/bibliometrics-global-gender-disparities-in-science-1.14321

An age-old story

The academic pipeline from junior to senior faculty leaks female scientists, and the senior ranks of science bear the imprint of previous generations' barriers to the progression of women. Many of the trends can be explained by the under-representation of women among the elders of science. Seniority, authorship position, collaboration and citation are all highly interlinked variables. There is an urgent need for programmes fostering international collaboration for female researchers. This might help to level the playing field.

"There are reasons why the world's combined innovative capacity has spewed forth iPhones and space shuttles but not yet managed to produce clean energy or universal access to clean water."

Jack Stilgoe



International Network